

Application No. 10/007,175
Response to Office Action

Customer No. 01933/

R E M A R K S

Reconsideration of this application, as amended, is respectfully requested.

ALLOWABLE SUBJECT MATTER

The Examiner's indication of the allowability of the subject matter of claims 12 and 14 is respectfully acknowledged.

These claims, however, have not been rewritten in independent form at this time since, as set forth in detail hereinbelow, it is respectfully submitted that their respective parent claims also recite allowable subject matter.

THE PRIOR ART REJECTION

Claims 1, 3-7, 9-11 and 13 were rejected under 35 USC 103 as being obvious in view of the previously cited combination of USP 5,153,833 ("Gordon et al") and USP 5,479,597 ("Fellous"). This rejection, however, is respectfully traversed.

On pages 3-4 of the Office Action, the Examiner points out that Gordon et al does not disclose any material in particular as being used to form the wheels. The Examiner contends, moreover, that even if Gordon et al did disclose a material for forming the wheels, it would not be inherent that the radius of the wheels would shrink due to abrasion. And the Examiner points out that

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"determining the changing radius of the wheels" is not recited in the claims.

The Examiner is correct in noting that independent claims 1, 6 and 13 do not explicitly recite "determining the changing radius of the wheels." However, it is respectfully pointed out that the failure of Gordon et al to account for the possibility of the radius of the wheels changing is the reason that measuring a number of rotations of the wheels with encoders as disclosed by Gordon et al is not the same as measuring a length of a portion of a wheel of the moving pedestal, which has been brought into contact with the floor surface, as according to the present invention as recited in independent claims 1, 6 and 13.

In short, Gordon et al discloses inferring length of the portion of the wheel brought into contact with the floor by measuring the rotation of the wheel and by assuming that the radius of the wheel will remain unchanged. By contrast, according to the claimed present invention, the length of the portion of the wheel of the moving pedestal, which has been brought into contact with the floor surface, is measured, rather than inferred/approximated as in Gordon et al.

It is respectfully submitted, moreover, that the technique disclosed by Gordon et al is apt to yield inaccurate results as the wheels thereof wear down. And as explained in detail

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hereinbelow, the wheels of Gordon et al are, in fact, likely subject to degradation and abrasion with use.

First, it is respectfully submitted that, despite Gordon et al's failure to explicitly state a material of its wheels, the wheels of Gordon et al are rubber. In particular, the wheel 42 in Fig. 1B of Gordon et al appears to be a tire (and therefore is probably made of rubber).

Moreover, it is respectfully submitted that for the type of pedestal of the present invention and of Gordon et al, rubber wheels are the most common and suitable for moving along a floor surface. The floors of television studios are typical, not especially flat floors, and as such have small irregularities. Accordingly, in order to move reliably across a studio floor, the wheels should not be made from a hard material (unless the wheels move on rails). Otherwise, the irregularities of the floor surface are directly reflected through the wheels onto a camera mounted on the pedestal when the pedestal moves, thereby potentially causing vibration in images taken by the camera. In order to prevent such vibrations, cushioned rubber wheels are conventional. Hard wheels may also disadvantageously make noise when moving.

However, rubber wheels degrade and change radius due to abrasion during use. Specifically, as explained in the Amendment filed on August 4, 2005, such changes in radius can cause

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significant errors if the moving amounts of the wheels are calculated by measuring the rotation of the wheels and assuming a constant radius.

In addition, the wheels of a pedestal for a camera bear a lot of weight from the pedestal and camera loaded thereon. Accordingly, it is unavoidable that the wheels, which are made of rubber, are deformed due to the weight and thus change radius on the floor. This deformation (radius change) of the wheels due to the weight can cause large errors in detecting the moving distance.

As explained in detail below, moreover, the radius change of rubber wheels with use or deformation cannot be determined in any one way mathematically, because the change of radius depends on the floor surface material and the weight of the pedestal and camera loaded thereon.

For example, according to an experiment conducted by the assignee for a pedestal, a decrease of 1 mm in the radius was caused in wheels with a radius of 63 mm due to the weight of a pedestal and a camera loaded thereon.

In this case, measuring the rotation of the wheels and assuming a constant radius to infer or extrapolate the length traveled by the wheels on the floor as in Gordon et al would yield a result of $63 \text{ mm} \times 2\pi = 126\pi$ for one revolution, while the length of the portion of the wheel that contacts the floor in the

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manner of the present invention would be expected to be $62 \text{ mm} \times 2\pi = 124\pi$ for one revolution (not taking into account other sources of error). Accordingly, in this case, an error of about $2\pi \text{ mm}/126\pi \text{ mm} = 1.59\%$ should be caused by using the technique of Gordon et al based on the deformation due to the load borne by the wheels alone.

Further, when wheels are fabricated, it is inevitable that industrial products will suffer fluctuations in dimensions. For example, the dimensional tolerance of wheels having a diameter of 126 mm used by the assignee is 126mm is $\pm 0.5 \text{ mm}$, thereby yielding fluctuations of diameter from one wheel to the next of up to 1 mm. This additional inaccuracy in the expected radius of the wheel would be expected to result in further errors when inferring a moving distance of the wheel.

Thus, simply due to the load of the pedestal on the wheel and dimensional fluctuations due to manufacturing, in addition to changes in the radius due to abrasion, the inferring of the distance traveled by the wheel based on the rotation of the wheel can results in errors that are quite significant when the pedestal travels several meters.

By contrast, the error can be much reduced when measuring (rather than inferring or extrapolating) the length of the portion of the wheel of the moving pedestal, which has been brought into contact with the floor surface, in the manner of the

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present invention as recited in independent claims 1, 6 and 13. For example, the roller recited in allowable claims 12 and 14 (for measuring the length of the surface of the wheel that has contacted the floor) may be much smaller than the wheel itself (e.g. 25 mm), and therefore the dimensional tolerance thereof may also be much smaller (e.g. 0.01 mm), thereby resulting in reduced error, in addition to the error reduction obtained by accounting for deformation of the wheel and abrasion of the wheel.

In order to accurately maintain the pan angle of the camera, which is important to synthesize virtual images, it is necessary to measure the rotation angle of a camera-mounting pedestal with high accuracy. Accordingly, it is required to accurately detect the moving distance and the rotation angle of the pedestal derived from the detected moving distance. For this purpose, the technique of the claimed present invention is important.

It is respectfully submitted that measuring a length of a portion of a wheel of the moving pedestal, which has been brought into contact with the floor surface, as recited in independent claims 1, 6 and 13, is significantly different from inferring or extrapolating the length by measuring wheel rotation and assuming a value of the wheel radius, as in Gordon et al, whether or not the "changing radius of the wheel" is explicitly recited in the claims. That is, measuring a length is not the same as extrapolating it, and it is respectfully pointed out that the

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extrapolation of Gordon et al can yield significant errors as compared to the measurement of the claimed present invention.

Fellous, moreover, has again merely been cited for the disclosure of the operation together of a real and synthetic image.

In view of the foregoing, it is again respectfully submitted that the present invention as recited in amended independent claims 1, 6 and 13, and claims 3-5, 7, 9-12 and 14 respectively depending therefrom, clearly patentably distinguishes over the combination of Gordon et al and Fellous under 35 USC 103.

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Entry of this Amendment, allowance of the claims and the passing of this application to issue are respectfully solicited.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned for prompt action.

Respectfully submitted,

/Douglas Holtz/

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